Hall Ticket Number :										

R-14

Code: 4GC31

II B.Tech. I Semester Supplementary Examinations May 2019

Mathematics-II

(Common to CE & ME)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Test for consistency and solve 5x+3y+7z=4; 3x+26y+2z=9; 7x+2y+10z=5 8M

   b) Show that the Eigen values of diagonal matrix are just the diagonal elements of the matrix 6M

OR

2. a) Determine the rank of the matrix $\begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$ by reducing into Echelon form 7M

   b) Investigate the values of λ and μ so that the equations

   2x+3y+5z=9; 7x+3y-2z=8; 2x+3y+λz=μ

   have (i) no solution (ii) a unique solution and (iii) an infinite number of solutions 7M

UNIT–II

3. a) Find a root of the equation $x^2 - 4x - 9 = 0$ using bisection method correct to three decimal places 7M

   b) Find the missing term in the table

x	2	3	4	5	6
y	45	49.2	54.1	-	67.4

7M

OR

4. a) Find the Cubic polynomial which takes the values. $y(0)=1$, $y(1)=0$, $y(2)=1$ and $y(3)=10$ 7M

   b) Using Newton-Raphson Method, compute $\sqrt{41}$ correct to four decimal places 7M

UNIT–III

5. Apply Fourth order Runge-Kutta Method to find an approximate value of y when $x=1.2$ in step of 0.1, given that $y' = x^2 + y^2$, $y(1)=1.5$. 14M

OR

6. Employ Taylor's method to obtain approximate value of y at $x=0.2$ for the differential equation $\frac{dy}{dx} = 2x + 3e^x$ $y(0)=0$. Compare the numerical solution obtained with the exact solution 14M

UNIT–IV

7. Prove that $x^2 = \frac{®^2}{3} + 4\sum_{n=1}^{\infty} \frac{(-1)^n \cos nx}{n^2}$, $-® < x < ®$.

Hence show that

$(i) \sum \frac{1}{n^2} = \frac{®^2}{6}$

$(ii) \sum \frac{1}{(2n-1)^2} = \frac{®^2}{6}$

$(iii) \frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + ---- == \frac{®^2}{12}$ 14M

OR

8. Find the half range sine and cosine series of $f(x) = x$ in $0 < x < 2$ 14M

UNIT–V

9. a) Apply C-R conditions to $f(z) = z^2$ and show that the function is analytic everywhere. 7M

b) Evaluate $\int_c \frac{1}{(z-1)(z-3)} dz$ with C: $|z| = 2$ using Cauchy's Integral Formula 7M

OR

10. a) Using Cauchy's Integral Formula $\int_c \frac{\sin^2 z}{\left(z - \frac{®}{6}\right)^3} dz$ Evaluate where C is Unit Circle. 7M

b) If $u = x^2 + y^2$, find harmonic conjugate $v(x, y)$ and write the corresponding complex potential $f(z) = u + iv$ 7M

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Hall Ticket Number :										

R-14

Code: 4G631

II B.Tech. I Semester Supplementary Examinations May 2019

Strength of Materials–I

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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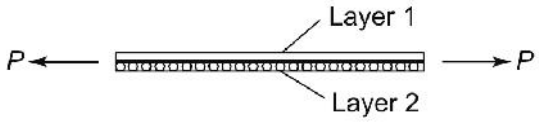
UNIT–I

1. a) Define poisons ratio. Why its value lies between 0 and 1/2 for stable materials. 4M

   b) Two layers of carbon fiber are stuck to each other, so that their fibres lie at 90° to each other, as shown in Figure. If a tensile force of 1 kN were applied to this two-layer compound bar, determine the stresses in each. For layer 1, E_1 = 300 GPa and A_1 = 10 mm^2 For layer 2, E_2 = 50 GPa and A_2 = A1 = 10 mm^2.



10M

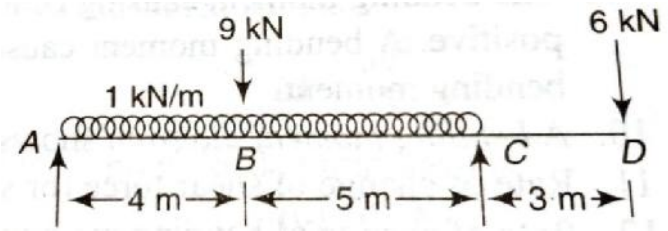
OR

2. a) Define strain energy. Calculate strain energy for a specimen in simple tension test. 4M

   b) What change in volume would a 20 cm cube of steel suffer at a depth of 4 km in sea water? Take E=200Gpa, and poisons ratio=0.29. Density of sea water=1.02g/cc. 10M

UNIT–II

3. a) Draw the shear force and bending moment diagram for the beam shown below indicating salient features.



10M

   b) Classify the beams based on support reactions with neat diagram. 4M

OR

4. a) Indicate the shapes of the shear force and bending moment diagrams in case of UDL and for triangular loads. 4M

   b) A cantilever beam carries a distributed load the intensity of which varies linearly from 10kN/m at the fixed end to 5kN/m at the free end along with point load of 2kN at free end. Draw the shear force and bending moment diagrams. 10M

UNIT–III

5. a) State the assumptions made in the theory of Euler-Bernouli beam. 4M

   b) A cast iron pipe of 200mm internal diameter and 220mm external diameter is supported at two ends 8m apart. Determine the maximum stress in the pipe material when it runs full. The density of the cast iron is 70kN/m^3 and of water 9.81kN/m^3. 10M

OR

6. Derive the expression for shear stress distribution in solid circular beam. Obtain the ratio between the maximum and average shear stress. 14M

UNIT–IV

7. a) A beam of length 6m is simply supported at its ends and carries two point loads of 36kN and 40kN at a distance of 1m and 3m respectively from the left support. Find the deflection under each load and maximum deflection using Macaulay's functions. 10M

   b) What are Macaulay's functions? State their significance in deflections of beams. 4M

OR

8. An overhang beam with equal overhangs of 1m is loaded with two point loads of 40kN each at the ends of the beam. Length of the beam is 4m. EI=5100 kN-m^2. Use moment area method to find the deflection at the midspan C and at the free end D of the overhang beam. 14M

UNIT–V

9. a) Define state of stress at a point. What is the significance of principal stresses? 4M

   b) State of stress at point is given as $\sigma_x = 4MPa$, $\sigma_y = 2MPa$ and $\tau = -7Mpa$.

   Draw the Mohr's circle and hence deduce principal stresses and maximum shear stress. Find also the inclinations of principal planes. 10M

OR

10. a) State maximum strain theory of failure and draw the failure envelop with neat diagram indicating salient points. 10M

    b) Maximum principal stress theory is used for designing of brittle materials preferably. Comment. 4M

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Hall Ticket Number :										

R-14

Code: 4G632

II B.Tech. I Semester Supplementary Examinations May 2019

Surveying

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. Explain about classification of surveying 14M

OR

2. The following bearings are the bearings observed in traversing, with a compass, an area where local attraction was suspected. Calculate the interior angles of the traverse and correct them?

Line	FB	BB
AB	$150^0 0'$	$330^0 0'$
BC	$230^0 30'$	$48^0 0'$
CD	$306^0 15'$	$127^0 45'$
DE	$298^0 0'$	$120^0 0'$
EA	$49^0 30'$	$229^0 30'$

14M

UNIT–II

3. The following readings were obtained in running a line of fly levels from a B.M of elevation 162.350. From the position of the instrument, 6 pegs at 20 mm intervals are to be set out on a uniform falling gradient of 1 in 50. The first peg is to have a RL of 162.220. Work out the staff readings required for setting the tops of the pegs on the given gradient and enter the result in a level book form.

Back sight	2.850	1.690	2.075	1.720	0.955
Fore sight	2.325	1.575	2.340	1.855	

14M

OR

4. The following offsets were taken at 15 m intervals from a survey line to an irregularly boundary line: 3.50, 4.30, 6.75, 5.25, 7.5, 8.80, 7.90, 6.40, 4.40 and 3.25 m. Calculate the area enclosed between the survey line, the irregular boundary line, and the first and last offsets by trapezoidal rule and Simpson's rule. 14M

UNIT–III

5. a) Explain about Gale's traverse table 7M

   b) Explain about Temporary and permanent adjustments of vernier transit theodolite 7M

OR

6. a) Write the desired relations between fundamental lines and enumerate the permanent adjustments of vernier transit theodolite. Explain the temporary adjustments 7M

b) A straight tunnel is to be run between two points A and B whose independent coordinates are:

Station	Northing	Easting
A	0	0
B	3014	256
C	1764	1398

It is desired to sink a shaft at D, the mid-point of AB. It is not possible to measure along AB directly. Therefore, D is to be fixed from C, another point whose independent coordinates are known. Calculate the:

(i) Independent coordinates of D
(ii) Length of bearing of CD
(iii) Angles ACD, given the W.C.B of AC is $38^0 35'$. 7M

UNIT–IV

7. a) List out the methods of plane table surveying 7M

b) The bearing of the sides of traverse ABCDE are given below. Compute the interior angles of the traverse.

Line	Fore bearing	Back bearing
AB	$110^0 15'$	$290^0 15'$
BC	$35^0 15'$	$215^0 15'$
CD	$276^0 30'$	$96^0 30'$
DE	$195^0 30'$	$15^0 30'$
EA	$131^0 15'$	$312^0 15'$

7M

OR

8. a) What is the principle of stadia tacheometry? Derive distance equation for staff vertical condition? 7M

b) The following observations are made on a vertical held staff:

Station	R.L. (m)	H.I (m)	Coordinates of station		Staff station	Vertical angle	Bearing	Stadia hair readings
A	1020.60	1.50	1800 N	800 E	P	$+8^0 12'$	$15^0 12'$	1.100, 1.850, 2.600
B	1021.21	1.53	2500 N	950 E	Q	$+2^0 11'$	$340^0 21'$	

The instrument is fitted with an anallactic lens and the instrument constant is 100. Compute the gradient from point P to point Q and bearing of PQ 7M

UNIT–V

9. a) What are the elements of a simple circular curve? What are unit chord and sub chord? 7M

b) A circular curve has a 200 m radius and 65^0 deflection angle. Find (i) Degree of the curve (ii) Length of the curve (iii) Tangent length (iv) Length of long chord (v) Apex distance and (vi) Mid-ordinate 7M

OR

10. What are the characteristics and functions of a Total Station? Enumerate the parts of a Total station Instrument with a neat sketch. 14M

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II B.Tech. I Semester Supplementary Examinations May 2019

Fluid Mechanics

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) A velocity profile of a flowing fluid over a flat plate is parabolic and given by $u = ay^2 + by + c$ where a, b and c are constants. The velocity of fluid is $1.2\ m/s$ at $20\ cm$ from the plate which the vertex point of the velocity distribution. Find out the velocity gradients and shear stresses at $y = 0, 10$ and $20\ cm$ respectively.

   b) Write short notes on micro manometers.

OR

2. A solid cylinder of diameter $4.0\ m$ has a height of $4.0\ m$. Find the meta-centric height of the cylinder if the specific gravity of the material of $cylinder = 0.6$ and it is floating in water with its axis vertical. State whether the equilibrium is stable or unstable.

UNIT–II

3. a) What are the different forms of energy in a flowing fluid? Represent schematically the Bernoulli's equation for flow through a tapering pipe and show the position of total energy line and the datum line.

   b) What is a flow net? Give it uses.

OR

4. The velocity components in a two-dimensional flow are

   $u = y^3/3 + 2x - x^2y$ and $v = xy^2 - 2y - x^3/3$.

   Show that these components represent a possible case of an irrational flow.

UNIT–III

5. A pumping station supplying water to a town of the one lac population is located at $5\ km$ from the town. The water required is $200\ L/per\ person/day$. Half of the required water is to be supplied within $5\ hrs$. The loss in friction is limited to $25\ m$ of water. Determine the diameter of the pipe required.

OR

6. What is venturimeter? Also derive the expression to find the rate of flow through a venturimeter.

UNIT–IV

7. When do you call the boundaries as hydro dynamically smooth and rough?

OR

8. A laminar flow is taking place in a pipe of diameter $200\ mm$ The maximum velocity is $1.5\ m/s$. Find the mean velocity and the radius at which this occurs. Also calculate the velocity at $4\ cm$ from the wall of the pipe.

UNIT–V

9. a) What are Model laws?

   b) Explain Rayleigh's method.

OR

10. a) State Buckingham's $\pi - theorem$. What do you mean by repeating variables? How are the repeating variables selected in dimensional analysis?

    b) The discharge through a weir is $1.5\ m^3/s$. Find the discharge through the model of the weir if the horizontal dimension of the $model = \frac{1}{40}$ the horizontal dimension of the prototype and vertical dimension of the $model = \frac{1}{12}$ the vertical dimension of the prototype.

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